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matic work ever undertaken relating to American ornithology. The original estimate for the work was a series of eight volumes, in octavo, of about 1000 pages each. Its official designation is "Bulletin of the United States National Museum, No. 50." The first volume appeared near the close of the year 1901, and included the single family Fringillidae; the second was published in 1902, and covers the four families Tanagridae, Icteridae, Coerebidae, and Mniotiltidae; the third bears date 1904, and includes 15 of the remaining families of oscinine Passeres; the fourth, published in July of the present year, includes the remaining six families of the Oscines and the first four families of the Mesomyodi. These families are: Turdidae, Zeledoniidae, Mimidae, Sturnidae, Ploceidae, Alaudidae of the Oscines; Oxyruncidae, Tyrannidae, Pipridae, Cotingidae, of the Mesomyodi. These four volumes include "1675 species and subspecies, or somewhat more than half the total number of North and Middle American birds," or those found north of the Isthmus of Panama, which forms approximately the southern boundary of the area treated. The preparation of Part V is well advanced.

The treatment is entirely technical; definitions are given of all the higher groups, with keys to the minor divisions, and in the case of genera to the species and subspecies. The latter are described in detail, with a concise statement of their geographic ranges, followed by full (often annotated) bibliographic tables, which often frequently occupy the larger part of the text. But there is nothing relating to their life histories beyond, in some instance, a brief reference under the generic headings to the nest and eggs. The work is, however, invaluable to the systematist, and will ever remain a monument to the industry and painstaking accuracy of its author, and it will be long before its usefulness will be superceded by any subsequent work.

J. A. A.

BOTANY

Floral Ecology.— In the writings of Darwin and his contemporaries the structure and environmental relations of flowers hold a prominent place. This is only natural when we remember that the Darwinian theory is essentially a theory of adaptation. For a considerable time it seemed that interest in floral adaptations was lagging, but this kind of work is again being quite generally taken up. Possibly a reason for the renewal of interest is to be seen in the completion of Knuth's Handbuch, and certainly the popularity of this kind of investigation is attested by the promise of a complete translation of this large work from the Oxford press.

It is not surprising that the Italians, who until very recently have had Delpino — a pioneer in this field — among them, should show especial activity in studies of floral ecology. The Orto Botanico della R. Università di Napoli is now commencing the republication (Bull. Orto Bot. R. Univ. Napoli 2:3–65. 1904) of a portion of Delpino's Ulteriori Osservazioni which first appeared in 1873–'74. This is unquestionably one of the most important treatises on floral ecology and its republication will be welcomed by many to whom the original is not accessible. Delpino's elaborate classification was proposed at a time when there was not a broad basis of observation but the conception is certainly worthy of the most careful consideration and one of the chief problems before future workers in this field is to determine in how far floral adaptations may be thrown into real categories such as Delpino suggests. This is to be one of the crucial tests of adaptation which we need at the present stage of development of the evolution theory.

Before passing from the work of Delpino, it may not be out of place to mention that an appreciation of the man and a bibliography of his writings has just been published by Briosi (Atti Ist. Bot. Univ. Pavia II. 10: vi–xxi. 1907). Over one hundred and twenty titles are given, a large proportion of them being on various phases of vegetable ecology.

The fifth memoir of Scotti's series on the floral biology of the "Personatae" may be mentioned as another large undertaking. This number (Annali di Botanici 5:101–227. 1907) comprises the families Solanaceae, Scrophulariaceae, Bignoniaceae, Martyniaceae, Pedaliaceae, Orobanchaceae, Gesneriaceae, Lentibulariaceae, Globulariaceae and Acanthaceae. The work is largely a review of the literature on the floral ecology of these groups but it serves a useful purpose in bringing together in one place a detailed discussion of a large body of widely scattered observations.

Mattei (Bull. Orto Bot. R. Univ. Napoli 2:115–117. 1904) gives lists of visitors of *Dracunculus vulgaris*. Nicotra (Bull. Soc. Bot. Ital. 1906:128–131) discusses the floral ecology of Urginea, Agave and Smilax. Graenicher has published two papers (Bull. Nat. Hist. Soc. Wisc. n. s. 5:15–45, 84–95. 1907) on the pollination of Wisconsin flowers. In these the families Melanthaceae, Liliaceae, Convallariaceae, Saxifragaceae, and Grossulariaceae are considered. The observations are very similar to those made by Müller and MacLeod in Europe and by Robertson in our own country and it is to be hoped that the author will continue the work with vigor.

Burck has been engaged in studies of anther dehiscence and concludes (Proc. Kon. Akad. Amsterdam 1906: 390–396, and Rev. Gén. Bot. 19: 104–111. 1905) that the opening of the anther is effected by the withdrawal of water from the anther by sugar contained in the filament. This permits the dehiscence of the anther in an atmosphere saturated with moisture.

Harms (Ber. Deutch. Bot. Ges. 25: 165–176. 1907) has investigated cleistogamy in three species of the genus Clitoria. The studies were made on herbarium material. The author concludes that we are here dealing with a real cleistogamy in the sense in which Göbel uses the term. The characteristics of the cleistogamous flowers are the small size of the calyx, the absence of the corolla and a more or less pronounced reduction in the androecium.

Tuzson (Bot. Jahrb. 40: 1–14. 1907) has observed cleistogamy in *Robinia pseudacacia.* Two trees were found together in the same row of old trees along a street and he thinks it probable that one was derived from the other by vegetative reproduction. The individuals were about thirty to forty years old and have been under observation since 1902; since then they have flowered in 1904 and 1906. Fertilization occurs exceedingly rarely. In these forms cleistogamy must be considered a highly disadvantageous characteristic which originated discontinuously and which would be eliminated in the struggle for existence. The author does not agree with all of Göbel's views on cleistogamy but insists on the causal rather than the teleological attitude in the investigation of the problem.

Dop (Bull. Soc. Bot. Fr. IV. 7: 258–260. 1907) again discusses the mechanism of movement in the stamens of the Berberidaceae.

Fritsch (Verh. K. K. Zool.-Bot. Ges. Wien 56: 135–160. 1906) publishes list of insect visitors for about 150 species of the flora of Steiermark. The observations were made in 1904.

J. Arthur Harris.